Applied Motion Products
A MOONS' COMPANY



# Unparalleled: This planetary gearbox maintains its maximum efficiency even at the highest speeds

**PE** Planetary Gearheads are notably light and extremely powerful, yet suitable for complex production cycles due to a low friction bearing design and optimized lubrication. A genuine powerhouse at an attractive price.

## ❶ Light, but powerful

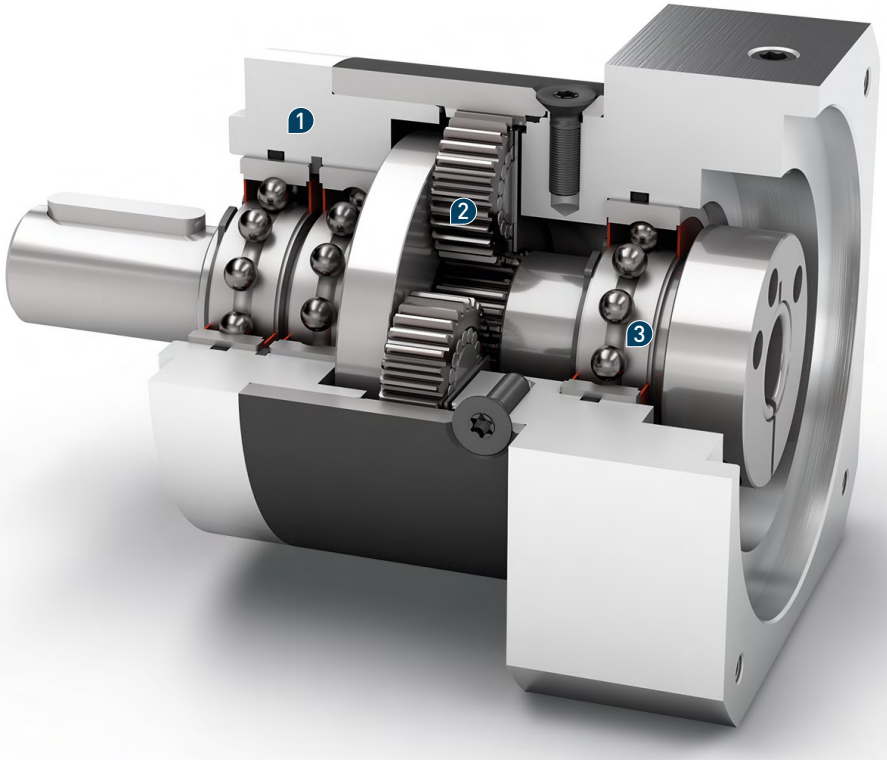
The **PE** excels with its above-average weight to torque ratio, and it is 25% lighter than comparable conventional drives. You accordingly benefit from the highest dynamics needed for multiple axis systems.

## ❷ Efficient and reliable

High performance at a fair price: This principle also applies to our **PE** planetary gearbox. It is powerful, yet efficient, and delivers a high performance for attractive acquisition costs.

## ❸ Low heat generation at the highest speeds

Even in extreme situations, the **PE** will never let you down thanks to its low-friction bearing design and optimized lubrication. The low heat generation allows a continuous high speed without sacrifice to performance.




- For any mounting position
- Individual adaptation of the input flange to the motor
- Lifetime lubrication for maintenance-free operation
- Equidirectional rotation
- Wide range of output shaft designs
- Clamping systems with optimized mass moment of inertia
- Precise gearing

| Code | Gearbox characteristics | | | 40PE | 60PE | 80PE | 120PE* | 160PE* | z(1) |
|---|---|---|---|---|---|---|---|---|---|
| | Service life | $t_L$ | h | 30,000 | | | | | |
| | Efficiency at full load (2) | η | % | 98 | | | | | 1 |
| | | | | 97 | | | | | 2 |
| | | | | 92 | | | | | 3 |
| | Min. operating temperature | $T_{min}$ | °C (°F) | -25 (-13) | | | | | |
| | Max. operating temperature | $T_{max}$ | | 90 (194) | | | | | |
| | Protection class | | | IP 54 | | | | | |
| S | Standard lubrication | | | Grease | | | | | |
| F | Food grade lubrication | | | Grease | | | | | |
| L | Low temperature lubrication (3) | | | Grease | | | | | |
| | Installation position | | | Any | | | | | |
| S | Standard backlash | $j_t$ | arcmin | < 15 | < 10 | < 7 | < 7 | < 6 | 1 |
| | | | | < 19 | < 12 | < 9 | < 9 | < 10 | 2 |
| | | | | < 22 | < 15 | < 11 | < 11 | - | 3 |
| | Torsional stiffness (2) | $c_g$ | Nm/arcmin ($lb_f$.in/arcmin) | 0.7 - 1.0 (6 - 9) | 1.7 - 2.3 (15 - 20) | 4.3 - 5.8 (38 - 51) | 10.8 - 14.5 (96 - 128) | 31.0 - 37.5 (274 - 332) | 1 |
| | | | | 0.8 - 1.0 (7 - 9) | 1.9 - 2.3 (17 - 20) | 4.7 - 5.8 (42 - 51) | 11.7 - 14.5 (104 - 128) | 30.5 - 37.5 (270 - 332) | 2 |
| | | | | 0.8 - 1.0 (7 - 9) | 1.8 - 2.3 (16 - 20) | 4.5 - 5.8 (40 - 51) | 11.2 - 14.5 (99 - 128) | - | 3 |
| | Gearbox weight | $m_G$ | kg ($lb_m$) | 0.35 (0.8) | 0.9 (2.0) | 2.1 (4.6) | 6 (13.2) | 18 (39.7) | 1 |
| | | | | 0.45 (1.0) | 1.1 (2.4) | 2.6 (5.7) | 8 (17.6) | 22 (48.5) | 2 |
| | | | | 0.55 (1.2) | 1.3 (2.9) | 3.1 (6.8) | 10 (22.1) | - | 3 |
| S | Standard surface | | | Housing: Steel – nitrocarburized and post-oxidized (black) | | | | | |
| | Running noise (4) | $Q_g$ | dB(A) | 58 | 58 | 60 | 65 | 70 | |
| | Max. bending moment based on the gearbox input flange (5) | $M_b$ | Nm ($lb_f$.in) | 3 (27) | 8 (71) | 16 (142) | 40 (354) | 140 (1239) | |
| | Motor flange precision | | | DIN 42955-N | | | | | |

| Output shaft loads | | | 40PE | 60PE | 80PE | 120PE* | 160PE* | z(1) |
|---|---|---|---|---|---|---|---|---|
| Radial force for 20,000h (6)(7) | $F_{r\ 20.000\ h}$ | N ($lb_f$) | 200 (45) | 400 (90) | 750 (169) | 1750 (394) | 5000 (1125) | |
| Axial force for 20,000h (6)(7) | $F_{a\ 20.000\ h}$ | | 200 (45) | 500 (113) | 1000 (225) | 2500 (563) | 7000 (1575) | |
| Radial force for 30,000h (6)(7) | $F_{r\ 30.000\ h}$ | | 160 (36) | 340 (77) | 650 (146) | 1500 (338) | 4200 (945) | |
| Axial force for 30,000h (6)(7) | $F_{a\ 30.000\ h}$ | | 160 (36) | 450 (101) | 900 (203) | 2100 (473) | 6000 (1350) | |
| Static radial force (7)(8) | $F_{r\ Stat}$ | | 200 (45) | 700 (158) | 1250 (281) | 2000 (450) | 5000 (1125) | |
| Static axial force (7)(8) | $F_{a\ Stat}$ | | 240 (54) | 800 (180) | 1600 (360) | 3800 (855) | 11000 (2475) | |
| Tilting moment for 20,000 h (6)(8) | $M_{K\ 20.000\ h}$ | Nm ($lb_f$.in) | 5 (44) | 14 (124) | 31 (274) | 101 (894) | 474 (4195) | |
| Tilting moment for 30,000 h (6)(8) | $M_{K\ 30.000\ h}$ | | 4 (35) | 12 (106) | 27 (239) | 86 (761) | 398 (3522) | |

| Moment of inertia | | | 40PE | 60PE | 80PE | 120PE* | 160PE* | z(1) |
|---|---|---|---|---|---|---|---|---|
| Mass moment of inertia (2) | J | kgcmİ ($lb_f$.in.$s^2$10$^{-4}$) | 0.014 - 0.027 (0.124 - 0.239) | 0.065 - 0.128 (0.575 - 1.133) | 0.359 - 0.654 (3.177 - 5.788) | 1.378 - 2.361 (12.195 - 20.895) | 3.726 - 11.999 (32.975 - 106.191) | 1 |
| | | | 0.015 - 0.026 (0.133 - 0.230) | 0.066 - 0.121 (0.584 - 1.071) | 0.365 - 0.613 (3.230 - 5.425) | 1.414 - 2.288 (12.514 - 20.249) | 3.502 - 10.087 (30.993 - 89.270) | 2 |
| | | | 0.015 - 0.025 (0.133 - 0.221) | 0.066 - 0.076 (0.584 - 0.673) | 0.365 - 0.590 (3.230 - 5.222) | 1.413 - 2.196 (12.505 - 19.435) | - | 3 |

*Contact Applied Motion Products for Price and Availability of 120 and 160 mm Gearboxes.

(1) Number of stages

(2) Contact Applied Motion Products for ratio-dependent values.

(3) $T_{min}$ = -40°C (-40°F). Optimal operating temperature max. 50°C (122°F)

(4) Sound pressure level from 1m, measured on input running at $n_1$=3000 rpm no load; i=5

(5) Max. motor weight* in kg = 0.2 x $M_b$ / motor length in m
* with symmetrically distributed motor weight
* with horizontal and stationary mounting

(6) These values are based on an output shaft speed of $n_2$ =100 rpm

(7) Based on center of output shaft

(8) Other (sometimes higher) values following changes to $T_{2N}$, $F_r$, $F_a$, cycle, and service life of bearing. Application specific configuration with NCP

| Output torques | | | 40PE | 60PE | 80PE | 120PE* | 160PE* | i(1) | z(2) |
|---|---|---|---|---|---|---|---|---|---|
| Nominal output torque (3)(4) | $T_{2N}$ | Nm ($lb_f$.in) | 11 (97) | 28 (248) | 85 (752) | 115 (1018) | 400 (3540) | 3 | 1 |
| | | | 15 (133) | 38 (336) | 115 (1018) | 155 (1372) | 450 (3983) | 4 | |
| | | | 14 (124) | 40 (354) | 110 (974) | 195 (1726) | 450 (3983) | 5 | |
| | | | 8.5 (75) | 25 (221) | 65 (575) | 135 (1195) | - | 7 | |
| | | | 6 (53) | 18 (159) | 50 (443) | 120 (1062) | 450 (3983) | 8 | |
| | | | 5 (44) | 15 (133) | 38 (336) | 95 (841) | - | 10 | |
| | | | 16.5 (146) | 44 (389) | 130 (1151) | 210 (1859) | - | 9 | 2 |
| | | | 20 (177) | 44 (389) | 120 (1062) | 260 (2301) | 800 (7080) | 12 | |
| | | | 18 (159) | 44 (389) | 110 (974) | 230 (2036) | 700 (6195) | 15 | |
| | | | 20 (177) | 44 (389) | 120 (1062) | 260 (2301) | 800 (7080) | 16 | |
| | | | 20 (177) | 44 (389) | 120 (1062) | 260 (2301) | 800 (7080) | 20 | |
| | | | 18 (159) | 40 (354) | 110 (974) | 230 (2036) | 700 (6195) | 25 | |
| | | | 20 (177) | 44 (389) | 120 (1062) | 260 (2301) | 800 (7080) | 32 | |
| | | | 18 (159) | 40 (354) | 110 (974) | 230 (2036) | 700 (6195) | 40 | |
| | | | 7.5 (66) | 18 (159) | 50 (443) | 120 (1062) | 450 (3983) | 64 | |
| | | | 20 (177) | 44 (389) | 110 (974) | 260 (2301) | - | 60 | 3 |
| | | | 20 (177) | 44 (389) | 120 (1062) | 260 (2301) | - | 80 | |
| | | | 20 (177) | 44 (389) | 120 (1062) | 260 (2301) | - | 100 | |
| | | | 18 (159) | 44 (389) | 110 (974) | 230 (2036) | - | 120 | |
| | | | 20 (177) | 44 (389) | 120 (1062) | 260 (2301) | - | 160 | |
| | | | 18 (159) | 40 (354) | 110 (974) | 230 (2036) | - | 200 | |
| | | | 20 (177) | 44 (389) | 120 (1062) | 260 (2301) | - | 256 | |
| | | | 18 (159) | 40 (354) | 110 (974) | 230 (2036) | - | 320 | |
| | | | 7.5 (66) | 18 (159) | 50 (443) | 120 (1062) | - | 512 | |
| Max. output torque (4)(5) | $T_{2max}$ | Nm ($lb_f$.in) | 17.5 (155) | 45 (398) | 136 (1204) | 184 (1628) | 640 (5664) | 3 | 1 |
| | | | 24 (212) | 61 (540) | 184 (1628) | 248 (2195) | 720 (6372) | 4 | |
| | | | 22 (195) | 64 (566) | 176 (1558) | 312 (2761) | 720 (6372) | 5 | |
| | | | 13.5 (119) | 40 (354) | 104 (920) | 216 (1912) | - | 7 | |
| | | | 10 (89) | 29 (257) | 80 (708) | 192 (1699) | 720 (6372) | 8 | |
| | | | 8 (71) | 24 (212) | 61 (540) | 152 (1345) | - | 10 | |
| | | | 26 (230) | 70 (620) | 208 (1841) | 336 (2974) | - | 9 | 2 |
| | | | 32 (283) | 70 (620) | 192 (1699) | 416 (3682) | 1280 (11328) | 12 | |
| | | | 29 (257) | 70 (620) | 176 (1558) | 368 (3257) | 1120 (9912) | 15 | |
| | | | 32 (283) | 70 (620) | 192 (1699) | 416 (3682) | 1280 (11328) | 16 | |
| | | | 32 (283) | 70 (620) | 192 (1699) | 416 (3682) | 1280 (11328) | 20 | |
| | | | 29 (257) | 64 (566) | 176 (1558) | 368 (3257) | 1120 (9912) | 25 | |
| | | | 32 (283) | 70 (620) | 192 (1699) | 416 (3682) | 1280 (11328) | 32 | |
| | | | 29 (257) | 64 (566) | 176 (1558) | 368 (3257) | 1120 (9912) | 40 | |
| | | | 12 (106) | 29 (257) | 80 (708) | 192 (1699) | 720 (6372) | 64 | |
| | | | 32 (283) | 70 (620) | 176 (1558) | 416 (3682) | - | 60 | 3 |
| | | | 32 (283) | 70 (620) | 192 (1699) | 416 (3682) | - | 80 | |
| | | | 32 (283) | 70 (620) | 192 (1699) | 416 (3682) | - | 100 | |
| | | | 29 (257) | 70 (620) | 176 (1558) | 368 (3257) | - | 120 | |
| | | | 32 (283) | 70 (620) | 192 (1699) | 416 (3682) | - | 160 | |
| | | | 29 (257) | 64 (566) | 176 (1558) | 368 (3257) | - | 200 | |
| | | | 32 (283) | 70 (620) | 192 (1699) | 416 (3682) | - | 256 | |
| | | | 29 (257) | 64 (566) | 176 (1558) | 368 (3257) | - | 320 | |
| | | | 12 (106) | 29 (257) | 80 (708) | 192 (1699) | - | 512 | |

*Contact Applied Motion Products for Price and Availability of 120 and 160 mm Gearboxes.

(1) Ratios ($i=n_1/n_2$)

(2) Number of stages

(3) Application specific configuration with NCP

(4) Values for feather key (code "A"): for repeated load

(5) 30,000 rotations of the output shaft permitted; see page 128

| Output torques | | | 40PE | 60PE | 80PE | 120PE* | 160PE* | i[1] | z[2] |
|---|---|---|---|---|---|---|---|---|---|
| Emergency stop torque[3] | $T_{2Stop}$ | Nm ($lb_f$.in) | 22,5 (199) | 66 (584) | 180 (1593) | 390 (3452) | 800 (7080) | 3 | 1 |
| | | | 30 (266) | 88 (779) | 240 (2124) | 520 (4602) | 900 (7965) | 4 | |
| | | | 36 (319) | 80 (708) | 220 (1947) | 500 (4425) | 900 (7965) | 5 | |
| | | | 26 (230) | 80 (708) | 178 (1575) | 340 (3009) | - | 7 | |
| | | | 27 (239) | 80 (708) | 190 (1682) | 380 (3363) | 900 (7965) | 8 | |
| | | | 27 (239) | 80 (708) | 200 (1770) | 480 (4248) | - | 10 | |
| | | | 33 (292) | 88 (779) | 260 (2301) | 500 (4425) | - | 9 | 2 |
| | | | 40 (354) | 88 (779) | 240 (2124) | 520 (4602) | 1600 (14160) | 12 | |
| | | | 36 (319) | 88 (779) | 220 (1947) | 500 (4425) | 1400 (12390) | 15 | |
| | | | 40 (354) | 88 (779) | 240 (2124) | 520 (4602) | 1600 (14160) | 16 | |
| | | | 40 (354) | 88 (779) | 240 (2124) | 520 (4602) | 1600 (14160) | 20 | |
| | | | 36 (319) | 80 (708) | 220 (1947) | 500 (4425) | 1400 (12390) | 25 | |
| | | | 40 (354) | 88 (779) | 240 (2124) | 520 (4602) | 1600 (14160) | 32 | |
| | | | 36 (319) | 80 (708) | 220 (1947) | 500 (4425) | 1400 (12390) | 40 | |
| | | | 27 (239) | 80 (708) | 190 (1682) | 380 (3363) | 900 (7965) | 64 | |
| | | | 40 (354) | 88 (779) | 220 (1947) | 520 (4602) | - | 60 | 3 |
| | | | 40 (354) | 88 (779) | 240 (2124) | 520 (4602) | - | 80 | |
| | | | 40 (354) | 88 (779) | 240 (2124) | 520 (4602) | - | 100 | |
| | | | 36 (319) | 88 (779) | 220 (1947) | 500 (4425) | - | 120 | |
| | | | 40 (354) | 88 (779) | 240 (2124) | 520 (4602) | - | 160 | |
| | | | 36 (319) | 80 (708) | 220 (1947) | 500 (4425) | - | 200 | |
| | | | 40 (354) | 88 (779) | 240 (2124) | 520 (4602) | - | 256 | |
| | | | 36 (319) | 80 (708) | 220 (1947) | 500 (4425) | - | 320 | |
| | | | 27 (239) | 80 (708) | 190 (1682) | 380 (3363) | - | 512 | |

| Input speeds | | | 40PE | 60PE | 80PE | 120PE* | 160PE* | i[1] | z[2] |
|---|---|---|---|---|---|---|---|---|---|
| Average thermal input speed at $T_{2N}$ and S1[4][5] | $n_{1N}$ | rpm | 5000 | 4500 | 4000[6] | 3400[6] | 1350[6] | 3 | 1 |
| | | | 5000 | 4500 | 3900[6] | 3500[6] | 1450[6] | 4 | |
| | | | 5000 | 4500 | 4000[6] | 3500[6] | 1700[6] | 5 | |
| | | | 5000 | 4500 | 4000 | 3500 | - | 7 | |
| | | | 5000 | 4500 | 4000 | 3500 | 2200[6] | 8 | |
| | | | 5000 | 4500 | 4000 | 3500 | - | 10 | |
| | | | 5000 | 4500 | 4000[6] | 3500[6] | - | 9 | 2 |
| | | | 5000 | 4500 | 4000[6] | 3500[6] | 1600[6] | 12 | |
| | | | 5000 | 4500 | 4000 | 3500[6] | 1900[6] | 15 | |
| | | | 5000 | 4500 | 4000 | 3500[6] | 1800[6] | 16 | |
| | | | 5000 | 4500 | 4000 | 3500 | 2100[6] | 20 | |
| | | | 5000 | 4500 | 4000 | 3500 | 2400[6] | 25 | |
| | | | 5000 | 4500 | 4000 | 3500 | 2700[6] | 32 | |
| | | | 5000 | 4500 | 4000 | 3500 | 3000[6] | 40 | |
| | | | 5000 | 4500 | 4000 | 3500 | 3000 | 64 | |
| | | | 5000 | 4500 | 4000 | 3500 | - | 60 | 3 |
| | | | 5000 | 4500 | 4000 | 3500 | - | 80 | |
| | | | 5000 | 4500 | 4000 | 3500 | - | 100 | |
| | | | 5000 | 4500 | 4000 | 3500 | - | 120 | |
| | | | 5000 | 4500 | 4000 | 3500 | - | 160 | |
| | | | 5000 | 4500 | 4000 | 3500 | - | 200 | |
| | | | 5000 | 4500 | 4000 | 3500 | - | 256 | |
| | | | 5000 | 4500 | 4000 | 3500 | - | 320 | |
| | | | 5000 | 4500 | 4000 | 3500 | - | 512 | |
| Max. mechanical input speed[4] | $n_{1Limit}$ | rpm | 18000 | 13000 | 7000 | 6500 | 6500 | | |

*Contact Applied Motion Products for Price and Availability of 120 and 160 mm Gearboxes.

[1] Ratios ($i=n_1/n_2$)

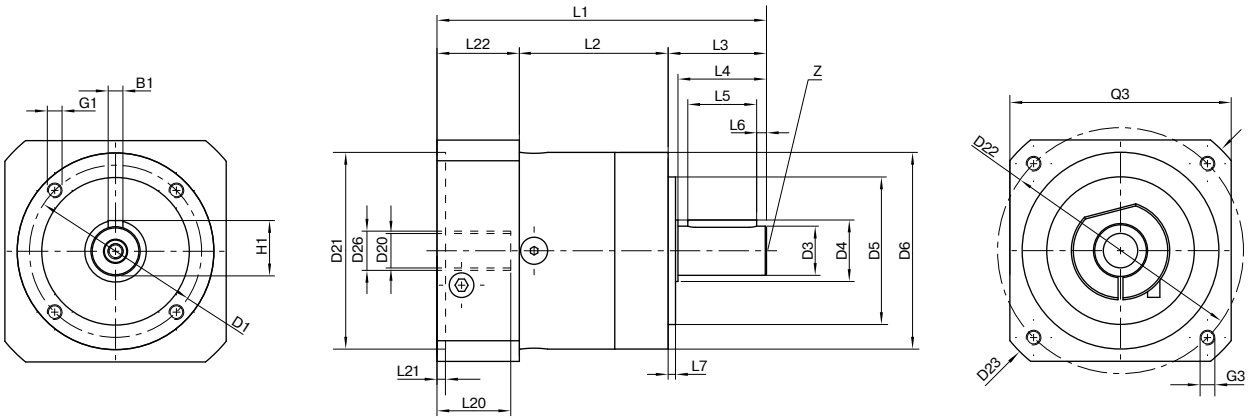
[2] Number of stages

[3] Permitted 1000 times

[4] Application-specific speed configurations with NCP

[5] See page 128 for the definition

[6] Average thermal input speed at 50% $T_{2N}$ and S1




Drawing corresponds to a 60PE / 1-stage / output shaft with feather key / 11 mm clamping system / motor adaptation – one part / B5 flange type motor

| **Geometry** [1] | | | **40PE** | **60PE** | **80PE** | **120PE*** | **160PE*** | **z**[2] | **Code** |
|---|---|---|---|---|---|---|---|---|---|
| Pitch circle diameter output | D1 | | 34 (1.339) | 52 (2.047) | 70 (2.756) | 100 (3.937) | 145 (5.709) | | |
| Shaft diameter output | D3 | h7 | 10 (0.394) | 14 (0.551) | 20 (0.787) | 25 (0.984) | 40 (1.575) | | |
| Shaft collar output | D4 | | 12 (0.472) | 17 (0.669) | 25 (0.984) | 35 (1.378) | 55 (2.165) | | |
| Centering diameter output | D5 | h7 | 26 (1.024) | 40 (1.575) | 60 (2.362) | 80 (3.150) | 130 (5.118) | | |
| Housing diameter | D6 | | 40 (1.575) | 60 (2.362) | 80 (3.150) | 115 (4.528) | 160 (6.299) | | |
| Mounting thread x depth | G1 | 4x | M4x6 | M5x8 | M6x10 | M10x16 | M12x20 | | |
| Min. total length | L1 | | 88.5 (3.484) | 106 (4.173) | 133.5 (5.256) | 176.5 (6.949) | 255.5 (10.059) | 1 | |
| | | | 101.5 (3.996) | 118.5 (4.665) | 150.5 (5.925) | 204 (8.031) | 305 (12.008) | 2 | |
| | | | 114 (4.488) | 131 (5.157) | 168 (6.614) | 231.5 (9.114) | - | 3 | |
| Housing length | L2 | | 39 (1.535) | 47 (1.850) | 60 (2.362) | 74 (2.913) | 104 (4.094) | 1 | |
| | | | 52 (2.047) | 59.5 (2.343) | 77.5 (3.051) | 101.5 (3.996) | 153.5 (6.043) | 2 | |
| | | | 64.5 (2.539) | 72 (2.835) | 95 (3.740) | 129 (5.079) | - | 3 | |
| Shaft length output | L3 | | 26 (1.024) | 35 (1.378) | 40 (1.575) | 55 (2.165) | 87 (3.425) | | |
| Centering depth output | L7 | | 2 (0.079) | 3 (0.118) | 3 (0.118) | 4 (0.157) | 5 (0.197) | | |
| Clamping system diameter input | D26 | | Motor dependent | | | | | | |
| Motor shaft diameter j6/k6 | D20 | | The dimensions vary with the motor/gearbox flange. | | | | | | |
| Max. permis. motor shaft length | L20 | | | | | | | | |
| Min. permis. motor shaft length | | | | | | | | | |
| Centering diameter input | D21 | | | | | | | | |
| Centering depth input | L21 | | | | | | | | |
| Pitch circle diameter input | D22 | | | | | | | | |
| Motor flange length | L22 | | | | | | | | |
| Diagonal dimension input | D23 | | | | | | | | |
| Mounting thread x depth | G3 | 4x | | | | | | | |
| Flange cross section input | Q3 | ■ | | | | | | | |
| Output shaft with feather key (DIN 6885-1) | | | A 3x3x18 | A 5x5x25 | A 6x6x28 | A 8x7x40 | A 12x8x65 | | **A** |
| Feather key width (DIN 6885-1) | B1 | | 3 (0.118) | 5 (0.197) | 6 (0.236) | 8 (0.315) | 12 (0.472) | | |
| Shaft height including feather key (DIN 6885-1) | H1 | | 11.2 (0.441) | 16 (0.630) | 22.5 (0.886) | 28 (1.102) | 43 (1.693) | | |
| Shaft length from shoulder | L4 | | 23 (0.906) | 30 (1.181) | 36 (1.417) | 50 (1.969) | 80 (3.150) | | |
| Feather key length | L5 | | 18 (0.709) | 25 (0.984) | 28 (1.102) | 40 (1.575) | 65 (2.559) | | |
| Distance from shaft end | L6 | | 2.5 (0.098) | 2.5 (0.098) | 4 (0.157) | 5 (0.197) | 8 (0.315) | | |
| Center hole (DIN 332, type DR) | Z | | M3x9 | M5x12.5 | M6x16 | M10x22 | M16x36 | | |
| Smooth output shaft | | | | | | | | | **B** |
| Shaft length from shoulder | L4 | | 23 (0.906) | 30 (1.181) | 36 (1.417) | 50 (1.969) | 80 (3.150) | | |

*Contact Applied Motion Products for Price and Availability of 120 and 160 mm Gearboxes.

[1] Dimensions in mm (in)

[2] Number of stages